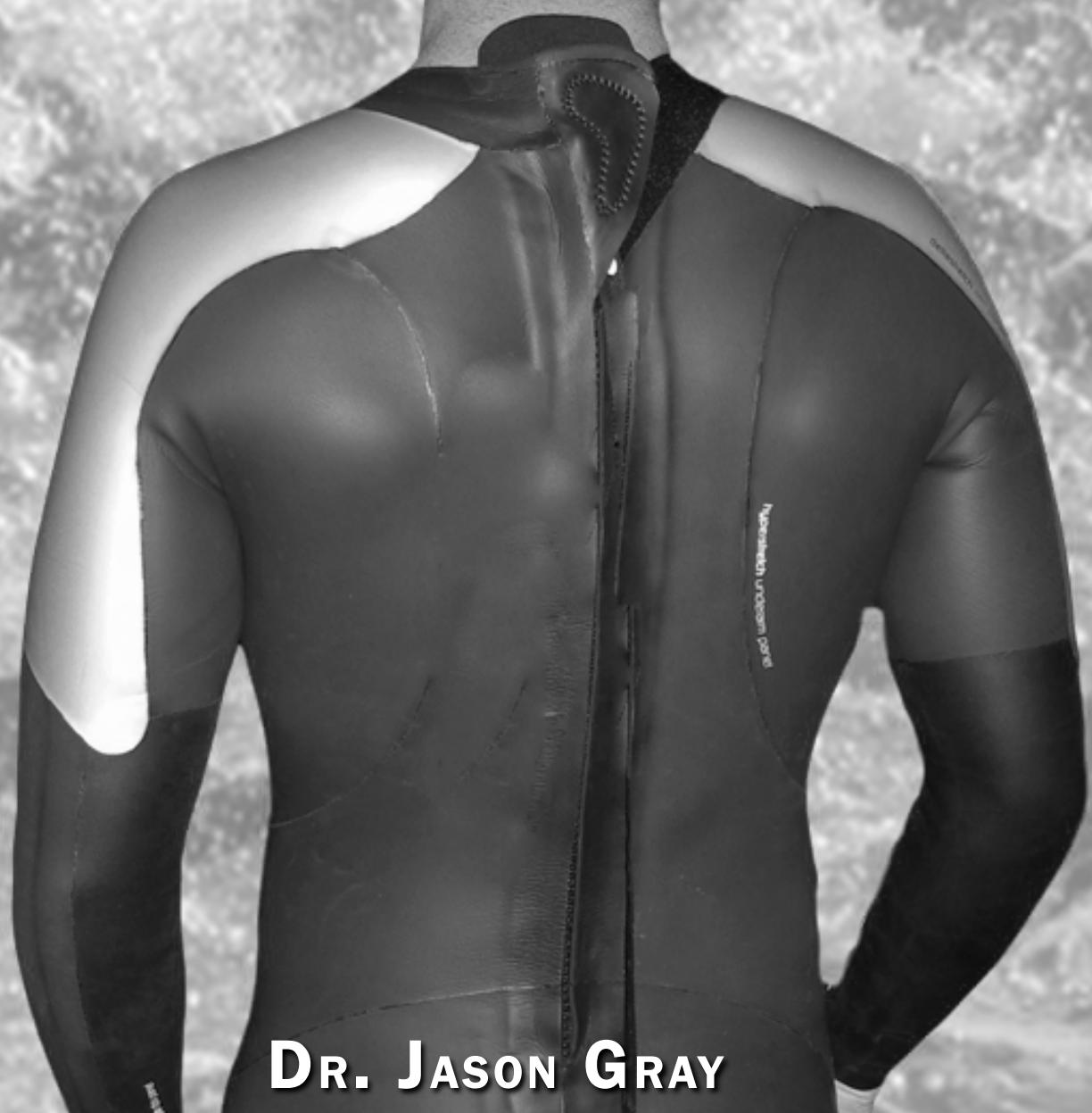


USER'S GUIDE

PERFORMANCE FLEXIBILITY™

FOR

TRIATHLETES



DR. JASON GRAY

Important – Please Read

Although the flexibility exercises contained in the Performance Flexibility™ for Triathletes program are safe and effective for most athletes, not all stretches or exercises are appropriate for everyone. If you experience any pain or discomfort while performing any of the flexibility exercises, you should consult a licensed health professional for a complete evaluation before continuing with the Performance Flexibility™ program. If you have a history of recurrent injury, or are currently recovering from an existing injury, you should wait until the condition has resolved or seek the opinion of a licensed health care professional prior to beginning the “Performance Flexibility™ for Triathletes” program.



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Why Stretch?

Stretching, especially for the athlete, can provide a number of positive effects such as enhanced performance, increased flexibility, faster recovery times, and reduced risk of injury. Unfortunately, general stretching programs have proven to be of little benefit to the triathlete. For a stretching program to be effective, the stretches must be specifically geared towards an athlete's particular sport. Achieving this can be especially challenging for triathletes as it is not one sport but three they must consider.

The good news is that this is precisely what we have done for you when we developed Performance Flexibility™ for Triathletes. With this program, not only will you experience reduced post-exercise stiffness and faster recovery times, but also, Performance Flexibility™ for Triathletes will enable you to perform more efficiently while minimizing wear-and-tear on your body.

To promote optimal performance and prevent injury we know that proper swimming, cycling, and running technique is essential. Improved technique does not mean that all swimming strokes, pedal strokes, and running strides need to be exactly the same. It does mean though, to be effective, there are certain key motions that must occur during each stroke or stride. For example: during each pedal stroke, the foot and ankle must flex and extend freely; during the pull phase of the swimming stroke, the shoulder must be able to fully rotate; and during the propulsive phase of each running stride the leg must be able to extend back behind the body. These are but a few examples of some of the movements that are critical to the triathlete. In order for these motions to occur consistently with minimal strain to the body, the muscles and joints must have adequate flexibility.

The reality is that many triathletes lack the required flexibility at one or more key areas. This in turn interferes with the proper swimming, cycling, or running technique. Poor flexibility forces your body to move in an altered manner as it attempts to compensate for the restricted mobility: a situation referred to as a "movement compensation." Not only will this cause the body to move less efficiently; thus, wasting energy, but movement compensations also increase the stress, and the risk of injury to your body.

Many triathletes spend countless hours training their aerobic system, but experience discouraging progress because much of the aerobic power they generate is lost due to inefficient movement patterns and “movement compensations.” The debilitating effects of “movement compensations” are always sad to see especially when we know that proper muscle and joint flexibility and movement would prevent such unnecessary outcomes. Unfortunately, without conscious effort to address these issues a triathlete will continue to perform below their capacity.

At Kinetesis Sport Solutions, we want to help build better athletes. Performance Flexibility™ for Triathletes is based upon a combination of the latest scientific research in the field of stretching and athletic performance, along with our work with triathletes while helping rehabilitate their injuries and preparing their bodies for optimal performance. To be most effective, we believe that you can not get the most from Performance Flexibility™ for Triathletes until you understand “the why” of our specialized stretching program. So in addition to teaching you the specific stretches, we will also teach you step-by-step how and when to stretch, and why each stretch is critical to staying healthy and performing at your optimum level.

How to stretch

It is important to realize that the flexibility and movement capacity of muscles and joints is dependent upon several factors - including active flexibility, passive tissue stiffness, muscle balance, and the control and regulation of muscle length by the nervous system. Since different types of stretching affect different components of flexibility, a variety of stretching techniques are needed to ensure all aspects of flexibility and movement regulation are addressed. This is why in the Performance Flexibility™ program, we have included 3 different types of stretches to ensure all the components of flexibility are trained. We have separated these 3 different types of stretches into distinct flexibility tracts and have arranged the stretches in a specific order so that each stretch builds on the next.

The Active Flexibility Tract

Performance Flexibility™ for Triathletes begins with active stretches which take advantage of the coordinated contraction and relaxation of opposing muscle groups. These stretches involve holding each stretch for just 1-2 seconds, but require multiple repetitions of each stretch. This type of movement helps promote muscle balance at key joints involved in running, cycling, and swimming. In addition, these active motions are a great warm-up as they increase blood flow to the working muscles, which not only increases flexibility but also helps prepare the muscles and joints for the next stages of the Performance Flexibility™ program.

The Passive Flexibility Tract

The active stretches are followed by the Passive Flexibility Tract which includes stretches designed to isolate the passive flexibility components of the key muscles and joints central to swimming, cycling, and running. These stretches resemble the more traditional types of stretches and require a longer holding time (i.e. 15-30 seconds) than the active flexibility stretches.

The Integrated Flexibility Tract

The final flexibility tract includes full-body integrated stretches. This tract is important because even though we often talk about muscles as if they stretch and contract independently of each other, this is not really how muscles work. In fact, muscles form intricate connections to each other through a specialized form of connective tissue known as fascia. This fascia essentially links different muscles together to form what are referred to as muscle slings. These slings span across several adjacent joints, providing a functional link between different body segments. In many cases, these muscle slings can travel all the way from the feet to the shoulders and arms. Not only is the strength and flexibility of each individual muscle important, but so too is the integrated strength and flexibility of the muscle slings. This final set of stretches incorporates very specific whole body movements designed to promote proper flexibility of the key muscle slings involved in running. The Core Strength program, which will be presented following the Performance Flexibility™ program, will also incorporate exercises to strengthen some of these key muscle slings.

When to stretch

The final thing we need to discuss is when to stretch. Many triathletes hold to the notion that stretching needs to be done prior to a work-out as a part of a warm-up; however, this is not necessarily the case. The first thing that needs to be emphasized is that stretching is not a warm-up. In fact, some studies have even suggested that static stretches prior to exercise may be detrimental to performance by altering the neurological control of movement and reducing the force producing capabilities of a muscle. Unfortunately, many coaches and trainers have reasoned this to mean that stretching is not important. This is simply not the case. In fact, there are many significant and important benefits to be gained from a well designed stretching program, but to be most effective, the program should not necessarily be done immediately before a race or workout. Instead, we recommend that the Performance Flexibility™ for Triathletes program be completed following a training session, or as an adjunct to your triathlon training. Through our work with triathletes and other athletes, we have found that performing a sport specific stretching program separate from your actual training can be a very effective way to develop and maintain optimal flexibility and movement. To understand why this is, let's back up and look at how the body responds to stretching in the first place. This understanding will clear up one more point of confusion regarding stretching.

Many people believe that stretching will actually lengthen a muscle; however, this is not really accurate. Stretching, generally, does not lengthen the muscle. Instead, it increases your muscles tolerance to stretch. This means that although your muscles do not actually get longer, you can stretch the muscle to a greater degree before you actually feel the stretch. This occurs in large part because the ability of a muscle to stretch is controlled by the nervous system through reflexes. A major part of the physiological effect of stretching is training these reflexes. It is important to realize that to develop and maintain these changes in reflex control and improved flexibility that these neuromuscular processes must be continually trained and challenged. In other words, for a stretching routine to be effective in maintaining optimal movement and therefore optimal movement efficiency, it must be done regularly.

Most triathletes we have worked with have found that going through the entire Performance Flexibility™ program each evening (which takes about 10-15 minutes) is one of the best ways to develop and maintain proper movement and flexibility. Using the Triathlon StretchMat™ makes

this easy to do even in your living room as you have the entire program in front of you and a comfortable surface to do your stretches. Of course, the program does not have to be done at night, but we have found that by doing the stretches in the evening it helps athletes to combat a lot of the increased muscle tension that develops through the day, and helps you to wake up looser and more prepared for the next days' training.

One of the best times to go through the Performance Flexibility™ for Triathletes program is each evening. This will help to decrease stiffness and speed recovery, ensuring you wake-up ready for the next days' training. In addition, completing the program daily will bring the muscles and joints through all of the key movements required to ensure optimal stride technique, helping to promote optimal efficiency and peak performance.

Ensuring Proper Form Is Critical To Success

To derive maximum benefit from Performance Flexibility™ for Triathletes, it is important to keep in mind that the major purpose of stretching is to improve movement and prevent the need for “movement compensations.” Just as the way the body moves during the running stride determines the effectiveness of the stride, the effectiveness of the stretch will be determined by how the body moves during the stretching exercises. In fact, if you perform stretches with the incorrect form, it is unrealistic to expect that the stretching program will correct your form or improve your movement efficiency. This means that proper form when performing the stretches is important to ensure that the stretch movement is occurring at the right areas.

Maintaining Proper Trunk Position

The most important factor in ensuring proper form with Performance Flexibility™ for Traithletes is keeping the pelvis and low back stable and in the correct position during the stretch sequences. Most triathletes have a tendency to have excessive motion at the pelvis and spine when stretching. This will cause problems as excessive motion at the spine not only fails to promote flexibility in the areas that need it, but can also create excessive strain to the back and pelvis; thus, instead of correcting faulty movement patterns, using the incorrect form during the stretches can actually facilitate running, cycling, and swimming technique faults and inefficient movement patterns!

To ensure proper form, it is important to actively hold the pelvis and spine in the correct position while stretching. This will prevent excessive spine and pelvic motion, and help ensure the stretch is occurring at the right areas. To do this, a common practice that can be incorporated into the stretches are Anterior and Posterior Pelvic Tilts.

With pelvic tilts you can used the hip and trunk muscles to pre-position the spine and pelvis in the correct position. While performing the stretch, you can simply hold the position to stabilize the spine and concentrate the stretch at the correct regions. In most cases, you will feel a dramatic difference in the quality and intensity of the stretch when incorporating a pelvic tilt into the stretch

sequences. It is worth noting that this practice is also supported by existing research, which shows adding a pelvic tilt to stretching exercises produces a greater increase in flexibility and range of motion, particularly with stretches for the legs and hips.

If you are unfamiliar with performing pelvic tilts, pages 12 through 19 explain what these pelvic tilts are, and how to perform both anterior and posterior pelvic tilts.

Anterior Pelvic Tilt

With an anterior pelvic tilt, the top of the pelvis rotates slightly forward while the bottom of the pelvis rotates backward. Since the pelvis and spine are connected, as the pelvis rotates anteriorly, the spine will arch to a greater degree accentuating the curve of the lower back.

To perform an anterior pelvic tilt, use the muscles of your lower back to pull the back of the pelvis upward and gently increase the arch in your lower back. As you do this, you should feel your pelvis rotate clockwise (if viewed from the right side), but you should not feel your upper body lean forward. Keep in mind that this is a small and subtle motion so you will not see or feel a great degree of movement.

Posterior Pelvic Tilt

With a posterior pelvic tilt, the top of the pelvis rotates backward while the bottom of the pelvis rotates forward. A posterior pelvic tilt will also cause the spine to straighten.

To perform a posterior pelvic tilt, use your abdominal muscles to pull the front of your lower pelvic bone up, and the muscles on the back of your hips to thrust your hips forward. It is also helpful to think about flattening the back as you do this. During this motion, your pelvis should rotate counter-clockwise (if viewed from the right side), but you should not feel your upper body lean backward or your knees bend. Once again, this is a small and subtle motion so you will not see or feel a great degree of movement.



Figure 1

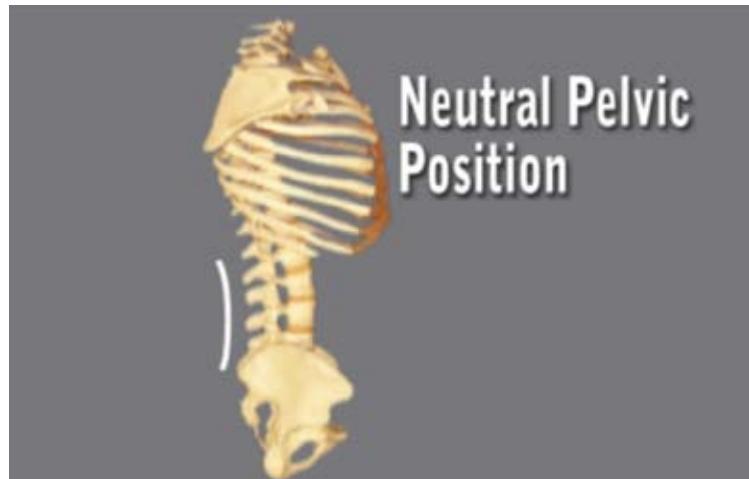


Figure 2



Figure 3

PELVIC TILT PROGRAM

For many triathletes, anterior and posterior pelvic tilts will come naturally and can be easily incorporated into their Performance Flexibility™ program. For others, holding the spine and pelvis in the proper position during the stretches will prove more challenging as they are not familiar with these movements. If you are in the latter group, it will be helpful to include some simple exercises in the early stages of the program to teach your body how to better activate the muscles of the trunk and pelvis, and to maintain the proper pelvic position. Go through these exercises prior to performing the Performance Flexibility™ for Triathletes program until you can easily perform the Anterior and Posterior Pelvic Tilts during the stretches. Once you have this mastered, there is no need to continue with the isolated pelvic positioning exercises as these motions will be reinforced during the Performance Flexibility™ program.

To develop better control of the anterior and posterior Pelvic tilts, perform the following exercise sequence prior to the Performance Flexibility™ program.

Quadruped Position

1. Begin on your hands and knees and slowly sag your back towards the mat – this is the anterior pelvic tilt position (**figure 1**).
2. Next, reverse this position and arch your spine toward the ceiling – this is the posterior pelvic tilt position (**figure 2**).
3. Slowly move between these two positions 10-15 times.

NOTE: While doing this try to concentrate the movement at the lower back by using your hips to initiate the movement. For example, as the back sags toward the floor you should feel your hips stick out behind you – and as your back flexes toward the ceiling, you should feel your hips tuck under your body. Pay attention to how these movements feel as they are the same movements you will use during the stretches.



Figure 1: anterior pelvic tilt position - notice how the spine sags toward the mat



Figure 2: posterior pelvic tilt position - notice how the spine arches up toward the ceiling

Supine Position

1. Begin on your back with the knees bent and feet flat on the mat.
2. Slowly arch your back off the mat by contracting the muscles of your lower back. As you do this, you should feel your hips push into the mat and your lower back lift off of the mat. This is the anterior pelvic tilt position (**figure 1**).
3. Next, push your lower back into the mat by contracting your abdominal muscles. This is the posterior pelvic tilt position (**figure 2**).
4. Simply repeat this back and forth motion 10-15 times.



Figure 1: anterior pelvic tilt position - notice how the spine arches away from the mat



Figure 2: posterior pelvic tilt position - notice how the spine flattens into the mat

Standing Position

1. From a standing position, gently contract the muscles of your lower back in an effort to arch your lower back and tilt your pelvis forward in a clockwise direction (if viewed from the right). This is the anterior pelvic tilt position (**figure 1**).
2. Next, perform a posterior pelvic tilt by contracting your abdominal and gluteal muscles in an effort to flatten out your back and bring your hips back underneath your body. This is the posterior pelvic tilt position (**figure 2**).
3. *NOTE: Keep in mind that these pelvic tilts are subtle motions so you should not expect to feel a great deal of movement. If you find your knees have a tendency to bend or your upper body leans backward or forward, this is a sign that you are trying to move too much or in an incorrect manner.*
4. Repeat this back and forth motion 10-15 times.

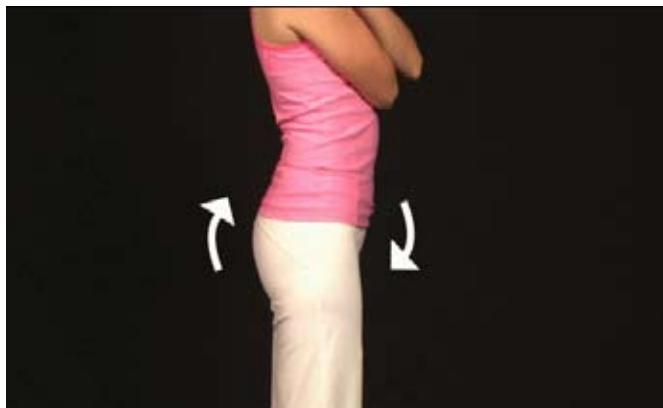


Figure 1: anterior pelvic tilt position
- notice how the spine arches and the pelvis rotates clockwise

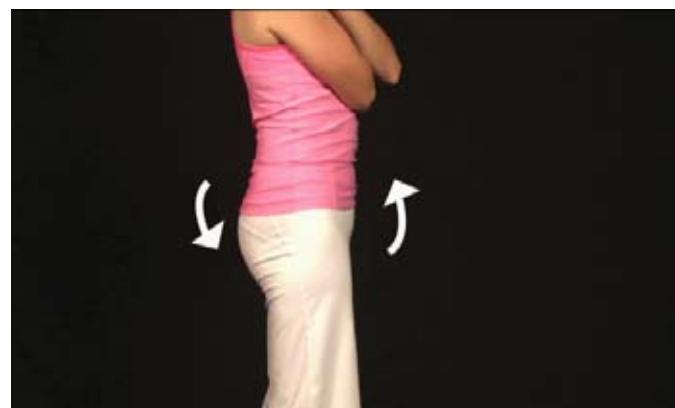


Figure 2: posterior pelvic tilt position - notice how the spine straightens and the pelvis rotates counter-clockwise

ACTIVE FLEXIBILITY TRACT

Kneeling Overhead Reach

Hold Time: 1-2 seconds

Repetitions: 10

Trunk Position: Does Not Apply

The Kneeling Overhead Reach is an active stretch designed to promote flexibility of the shoulder, particularly the Latissimus Dorsi and Rhomboid muscles. Adequate flexibility of these muscles is important to ensure that the arm can be fully raised overhead, which is a critical motion during the swimming stroke. If excessive muscle tightness restricts this overhead reach, the spine will compensate by extending in effort to position the arm overhead. This will pull the trunk out of position in the water, creating excessive drag forces in the water causing the triathlete to waste a tremendous amount of energy.

To perform the Kneeling Overhead Reach:

1. Begin on your hands and knees with your hands placed flat on the mat above the level of your shoulders (**figure 1**).
2. From this position slide your hips back toward your feet until you feel a stretch in the shoulders and upper back (**figure 2**).
3. Using your shoulder muscles, push your hands away from your body. This will further push the hips toward your feet and increase the stretch in your shoulders.
4. Hold this stretch position for 1-2 seconds and then release the stretch by returning to the starting position (**figure 1**).
5. Repeat this back and forth motion 10 times.



Figure 1: start position



Figure 2: stretch position

Kneeling Lunge

Hold Time: 1-2 seconds

Repetitions: 10

Trunk Position: Posterior Pelvic Tilt

The kneeling lunge stretch targets the hip flexor muscle groups, including the Iliopsoas and Quadricep muscles. Releasing tension in the hip flexors is important as tight hip flexors will restrict proper extension of the thigh during the push-off phase of the running stride, and can place excessive strain on the low back and pelvis, leading to number of hip, pelvis, and low back problems. From a performance standpoint, if hip extension is restricted, it will interfere with the proper stretch of the hip flexor muscles, particularly the Iliopsoas tendon, which in turn will create less elastic energy storage and reduced muscle force at the hip.

To perform the Kneeling Lunge stretch:

1. Begin in a kneeling position with the right knee on the mat and the left foot positioned in front of you (**figure 1**).
2. Perform a posterior pelvic tilt to ensure proper form. Hold this posterior pelvic tilt for the entire stretch.
3. Slide your upper body forward by bending your left knee and pushing forward with your right hip (**figure 2**).
4. *NOTE: As you do this, you should feel a stretch on the front of the right hip and thigh. It is important that you do not allow the lower back to arch or the upper body to lean forward during this movement. Either of these positions will be less effective in stretching the hip flexors and promoting optimal motion at the hip during the stride.*
5. Hold this stretch position for 1-2 seconds then release the stretch by returning to the starting position.
6. Perform this back and forth motion 10 times and then repeat on the opposite side.



Figure 1: start position



Figure 2: stretch position

Seated Calf Stretch

Hold Time: 1-2 seconds

Repetitions: 10

Trunk Position: Does Not Apply

The seated calf stretch helps to promote proper mobility at the foot and ankle. This is absolutely essential for an effective running stride and pedal stroke. Not only does this stretch help mobilize the joints of the foot and ankle, but it also targets the calf muscles – including the Gastrocnemius, Soleus, and deep toe flexor muscles, all of which are important stabilizers of the foot and ankle. In addition, the second part of movement during this active stretch targets the muscles of the shin – such as the Tibialis Anterior, Extensor Digitorum Longus, Extensor Digitorum Brevis, and Extensor Hallicus Longus. From an injury perspective, promoting proper mobility in these muscle groups can help prevent injuries such as Plantar Fasciitis, Achilles Tendonitis, and Shin Splints.

To perform the Seated Calf Stretch:

1. Begin in a seated position with both legs extended out in front of you.
2. *NOTE: It is best to keep your upper body tall and upright with your hands grasping your legs (**figure 1**). However, if excessive tightness in the back of the leg makes it difficult to attain this position, keep the upper body in a more extended position with the hands placed behind the body for support (**figure 2**).*
3. Pull your feet and toes up towards your shins and hold this position for 1-2 seconds (as you do this, you should feel a contraction in the muscles of the shin, and a stretch in the muscles of the calf) (**figure 3**).
4. From this position, push your feet and toes down and away and hold this position for 1-2 seconds (**figure 4**). In this position you should feel a stretch in your shins and a muscle contraction in your calf.
5. Repeat this up and down motion 10 times.



Figure 1: starting position



Figure 2: alternate starting position with the trunk extended

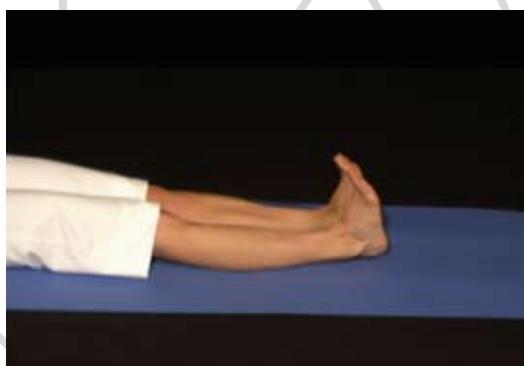


Figure 3: pull the toes and feet towards your shins



Figure 4: point the toes and feet away

Active Shoulder Rotation

Hold Time: 1-2 seconds

Repetitions: 10

Trunk Position: Does Not Apply

The Active Shoulder Rotation stretch is designed to promote flexibility and balance in the rotational muscles of the shoulder, particularly the rotator cuff muscles. These muscles are critical in moving and stabilizing the shoulder during the swimming stroke. Excessive tightness of this region can restrict the range of motion available at the shoulder, leading to a number of movement compensations. From an injury perspective, muscle imbalances in the rotator cuff can also compromise the stability of the shoulder. This in turn often leads to injuries such as shoulder tendinopathy and impingement syndrome.

To perform the Active Shoulder Rotation Stretch:

1. Begin lying on your back with your elbows resting on the floor and your hands pointing towards the ceiling.
2. Keeping the elbows bent 90 degrees, push the palms toward the floor (**figure 1**).
3. *NOTE: To promote proper movement it is important not to let the shoulder blade lift up off the ground (**figure 2**). Rotate the arms as far as possible without allowing the shoulders to raise off the floor and hold for 2 seconds (**figure 3**).*
4. From this position, rotate the arms in the opposite direction so the back of the hands move toward the floor. Again, keep the elbows on the ground and this time do not allow the back to arch (**figure 4**).
5. Repeat this back and forth motion 10 times.



Figure 1: starting position



Figure 2: incorrect form - note how the shoulder raises off the floor



Figure 3: Correct form - note how the shoulder is flat on the ground



Figure 4: bring the back of the hands toward the floor

Floor Angel

Hold Time: 1-2 seconds

Repetitions: 10

Trunk Position: Posterior Pelvic Tilt

The Floor Angel targets the muscles of the chest, shoulders, and upper back, as well as the joints of the upper Thoracic spine and rib cage. Many runners assume that since running is primarily a lower body activity, promoting flexibility in the upper body is not important. Unfortunately, following this line of thinking can cause a number of problems as the upper body is very important to counter balance the movements of the legs and facilitate force transfer between the upper and lower body. Tight upper body muscles can also lead to postural compensations during the running stride which can interfere with proper breathing. The Floor Angel will help ensure this important, but often neglected region remains flexible and balanced.

To perform the Floor Angel:

1. Begin on your back with your knees bent and feet flat on the mat. Position your arms on the floor beside you with the elbows bent and palms facing the ceiling (**figure 1**).
2. From this position, slide the arms up overhead until you feel a stretch in the chest, shoulders, or upper back. Hold the stretch for 1-2 seconds (**figure 2**).
3. *NOTE: To ensure proper form throughout this movement, do not allow the lower back to arch (**figure 3**), or the elbows or hands to lose contact with the floor. To ensure proper form, it is helpful to push the lower back into the mat by performing a posterior pelvic tilt, and holding this position throughout the entire movement.*
4. Pull the arms back down and bring the elbows back toward the side of the rib cage while squeezing the shoulder blades together at the bottom of this motion (**figure 4**).
5. Repeat this motion 10 times.



Figure 1: starting position



Figure 2: stretch position - arms overhead



Figure 3: incorrect form - note how the back is arching up off the mat



Figure 4: squeeze the shoulder blades together as you pull the elbows in towards the body

PASSIVE FLEXIBILITY TRACT

Figure 4 Stretch

Hold Time: 15-30 seconds

Repetitions: 1

Trunk Position: Anterior Pelvic Tilt

The Figure 4 stretch is a passive stretch targeting the deep muscles on the back of the hip, including the Piriformis, proximal hamstring, and deep hip external rotator muscles. These muscles are critical in stabilizing the lower extremity during the stance phase of the running stride and allowing proper forward hip flexion during cycling. Excessive tension in these muscles will restrict the normal coupling pattern of the hip, knee, and ankle, often placing an excessive rotational strain on the lower extremity, particularly the hip and knee.

To perform the Figure 4 stretch:

1. Begin lying on your back with knees bent and feet flat on the mat. Cross the left leg over the right, resting the left ankle on the right knee (**figure 1**).
2. Keeping the left leg relaxed, lift the right knee toward your chest until you feel a light pull in the back of the left hip and upper thigh. This stretch is easier if you use your arms to help pull the thigh towards your chest (**figure 2**).
3. *NOTE: If you find it difficult to reach the leg with your hands, use a towel or yoga strap to assist you until your flexibility improves (**figure 3**).*
4. Hold this stretch position for 15-30 seconds then repeat on the opposite side.
5. *NOTE: If you find that your lower back has a tendency to push into the mat as you pull the thigh towards your chest, this is an indication that motion is occurring at the lower back instead of the hip. To prevent this, arch your lower back away from the mat by performing an anterior pelvic tilt. This will help concentrate the stretch at the hip and protect the back from excessive movement.*



Figure 1: starting position - cross 1 leg over the other



Figure 2: stretch position - pull the thigh towards your chest



Figure 3: use a towel or yoga strap to assist you if you cannot reach the leg comfortably

Frog Stretch

Hold Time: 15-30 seconds

Repetitions: 1

Trunk Position: Anterior Pelvic Tilt

The inner thigh muscles, which include the Adductor Longus, Adductor Brevis, and Adductor Magnus, are critical movers and stabilizers of the hip and leg during running, cycling, and swimming. Research studies show that these muscles are active for virtually all athletic activities. Not only are they important in stabilizing the leg and pelvis, but as the position of the thigh changes, they are also able to generate flexion and extension forces, especially during cycling and running. As a result of the high workload placed on this muscle group, it is very common for these muscles to become tight and restricted. When this happens, it can affect the proper alignment of the leg, predisposing the triathlete to a number of injuries such as Patello-Femoral Pain syndrome, IT Band Friction Syndrome, and Sacroiliac joint strain. As a result, keeping these muscles loose and flexible is critical to ensure proper movement and to prevent injury.

To perform the Frog stretch:

1. Begin seated with the soles of the feet together and the knees hanging toward the floor (**figure 1**).
2. From this position, lean the upper body forward until you feel a stretch on the inner portion of the upper leg (**figure 2**).
3. *NOTE: To concentrate the stretch at the adductor muscle group and to prevent excessive strain to the lower back, it is important to keep the lower back straight as you lean the upper body forward. To do this, perform an anterior pelvic tilt and hold this position throughout the entire stretch.*
4. If you find it difficult to maintain the proper form, position your feet further away from the body. This will make it easier to keep the back straight as your upper body leans forward. As your flexibility increases, progressively move the feet in closer to the body during subsequent flexibility training sessions.
5. Hold this stretch for 15 - 30 seconds.



Figure 1: *start position*



Figure 2: *stretch position*

Hurdler's Stretch

Hold Time: 15-30 seconds

Repetitions: 1

Trunk Position: Does Not Apply

The Hurdler's stretch is another classic running stretch designed to target the passive component of the Hamstring muscle group. During running, the hamstrings play a key role in controlling and protecting the knee during the stance phase of the stride. Not only is this important for preventing knee injuries, but also for providing a stable link at the knee which is critical in transferring the force generated at the hip and trunk across the knee to ensure it reaches the ground and contributes to forward propulsion. If excessive tightness exists in the Hamstrings, it can interfere with this important energy transfer process while creating abnormal mechanics at the knee. In addition to their key stance phase role, the Hamstring group is also very active during the late swing phase as these muscles contract to pull the foot in toward the body as the foot makes initial contact with the ground. As a result of the high demand on the Hamstring group, these muscles often become tight and restricted; therefore, promoting and maintaining mobility in this muscle group is critical.

To perform the Hurdler's Stretch:

1. Begin in a seated position with the left leg extended out in front of you and the sole of your right foot resting against the inside of your left knee (**figure 1**).
2. From this position lean your trunk forward until you feel a stretch in the back of the thigh (**figure 2**).
3. *NOTE: To concentrate the stretch at the hamstring group, it is important to keep the trunk tall and upright when leaning the upper body forward. To do this, perform an anterior pelvic tilt and hold this position throughout the stretch.*
4. Hold this stretch for 15-30 seconds, then repeat on the opposite side.



Figure 1: starting position

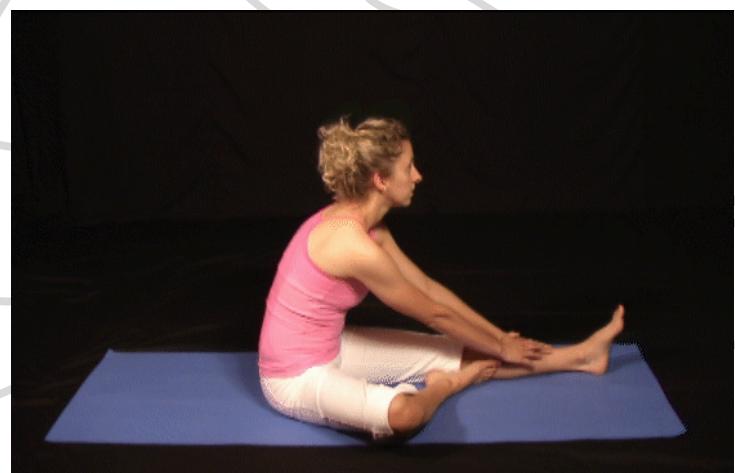


Figure 2: stretch position - note how the back remains straight

Floor Pec Stretch

Hold Time: 15-30 seconds

Repetitions: 1

Trunk Position: Does Not Apply

The Floor Pec Stretch targets the anterior chest and shoulder muscles, particularly the Pec Major, Pec Minor, and Coracobrachialis muscles. These muscles are critical in generating power during the pull phase of the swimming stroke. If excessive tightness develops in these muscles, it will pull the entire shoulder complex (including the shoulder blade and upper arm) forward on the rib cage. This will compromise the position and alignment of the shoulder and predispose the triathlete to a number of injuries such as tendinitis and Swimmer's Shoulder. In many cases, this faulty alignment can even affect the running stride by interfering with proper arm swing and respiration patterns.

To perform the Hurdler's Stretch:

1. Begin in a seated position with the left leg extended out in front of you and the sole of your right foot resting against the inside of your left knee (**figure 1**).
2. From this position lean your trunk forward until you feel a stretch in the back of the thigh (**figure 2**).
3. *NOTE: To concentrate the stretch at the hamstring group, it is important to keep the trunk tall and upright when leaning the upper body forward. To do this, perform an anterior pelvic tilt and hold this position throughout the stretch.*
4. Hold this stretch for 15-30 seconds, then repeat on the opposite side.



Figure 1: starting position



Figure 2: stretch position



Figure 3: if your flexibility allows, bring your left leg back over your right leg

Side-Lying Quad Stretch

Hold Time: 15-30 seconds

Repetitions: 1

Trunk Position: Posterior Pelvic Tilt

As the name implies, the Side-Lying Quad Stretch targets the Quadricep muscle group located on the front of the thigh. The Quadricep group experiences a considerable workload with both cycling and running. As a result, this muscle has a tendency to become tight and restricted. When this happens, it can lead to a number of problems including imbalances between the quads and hamstrings, and can predispose the triathlete to a number of injuries such as Patello-femoral Pain Syndrome (PFPS), Tendinitis, Sacroiliac joint pain, and anterior hip impingement.

To perform the Side-Lying Quad – Hamstring Reach:

1. Begin lying on your right side and bend the left knee so you can grasp the ankle with your arm (**figure 1**).
2. From this position perform a posterior pelvic tilt to ensure proper form during this phase of the stretch.
3. While holding the ankle with your hand, pull the thigh back behind your body by contracting the muscles on the back of the hip and leg while at the same time gently pulling up on the ankle with your arm (**figure 2**).
4. *NOTE: Do not allow the back to arch during this movement (**figure 3**). Holding a posterior pelvic tile during this phase of the movement should prevent this from occurring (see step 2).*
5. Hold this stretch position for 15-30 seconds and then repeat on the opposite side.



Figure 1: starting position



Figure 2: extend the thigh behind the body

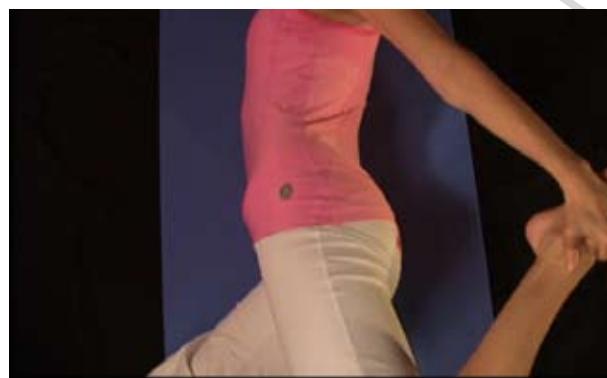


Figure 3: incorrect form - notice the forward trunk lean and excessive arch in the lower back

INTEGRATED FLEXIBILITY TRACT

Posterior Longitudinal Sling

Hold Time: 15-30 seconds

Repetitions: 1

Trunk Position: Anterior Pelvic Tilt

The Posterior Longitudinal Sling begins at the foot and ankle with the Achilles tendon and calf muscles. From here, the sling travels up the leg to include the Hamstring group, the posterior pelvic ligaments, and the Erector Spinae muscles located along the length of the spine. The Posterior Longitudinal Sling plays an important role in controlling and stabilizing the spine and upper body during the running stride. In addition, this muscle sling must have adequate flexibility to allow the triathlete to get into an aerodynamic position on the bike, and helps maintain proper body position during the swimming stroke.

To stretch the Posterior Longitudinal Sling:

1. From a standing position, bend forward at the waist and let your arms hang toward the floor. You should feel a stretch in the back of your legs (**figure 1**).
2. *NOTE: As you bend forward, do not force yourself to touch your toes as this will force the back to flex (**figure 2**). Instead, concentrate on hinging forward at the hips keeping the ear, shoulder, and hip in line (**figure 3**).*
3. To help ensure proper form, perform an anterior pelvic tilt and maintain this position throughout the entire stretch.
4. *NOTE: This stretch will target the fascial sling as opposed to the individual muscles which usually gives a slightly different sensation than the passive isolated stretches.*
5. Bring the upper body forward until you feel a gentle pull in the back of the legs. Hold for 15 – 30 seconds.

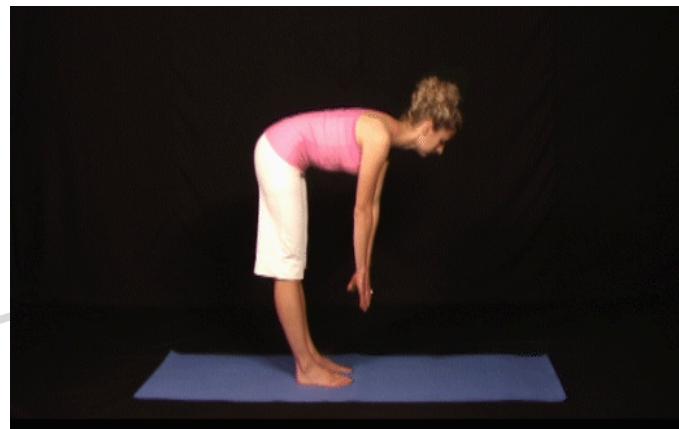


Figure 1: starting position

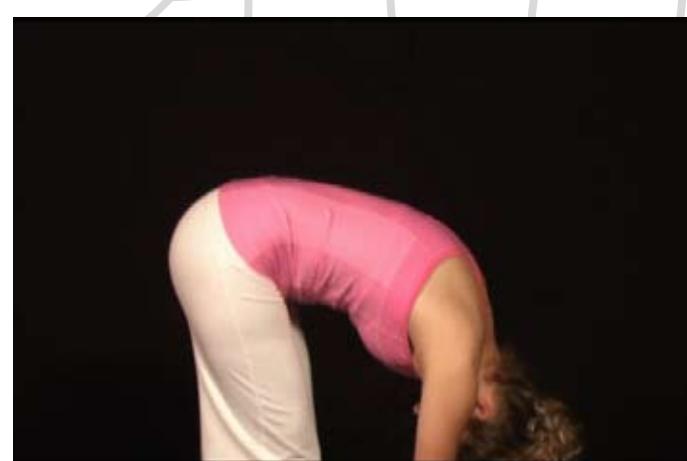


Figure 2: incorrect form - note how the back is rounded



Figure 3: proper form - note how the hip, shoulder, and head are all in line with each other

Standing Quad with Calf Stretch

Hold Time: 15-30 seconds

Repetitions: 1

Trunk Position: Posterior Pelvic Tilt

As the name implies, the Standing Quad with Calf Stretch targets both the Quadricep and calf muscle groups. During the running stride, the Quadricep must stretch to allow the hip to extend back behind the body with the knee in a flexed position. At the same time, the Achilles tendon and calf muscles must also stretch as the ankle flexes to allow the progression of the body over the planted foot. This stretch helps to simultaneously stretch both muscle groups, which helps to promote the needed flexibility in these two regions while developing a sense of balance and control as the stretch is performed on one leg.

To perform the Standing Quad stretch:

1. Begin in a standing position and bend the right knee so you can hold the ankle with your right hand (**figure 1**).
2. From this position, use the Glute muscles on the back of your hip to extend your thigh back behind your body while at the same time gently pulling up on the ankle with your arm (**figure 2**). As you do this, you should feel a stretch on the front of your right thigh.
3. *NOTE: Do not allow the lower back to arch during this stretch (**figure 3**). To prevent this from happening, perform a posterior pelvic tilt and hold this position for the entire stretch.*
4. While maintaining the stretch in your Quad, bend your left knee and ankle until you feel a stretch in the back of your calf (**figure 4**). You may find it difficult at first to hold your balance. If this is the case, be patient and soon your sense of balance will improve enough to make this stretch easier.
5. Hold this stretch for 15 – 30 seconds and then repeat on the opposite side.



Figure 1: starting position



Figure 2: pull the thigh back behind your body until you feel a stretch in your thigh

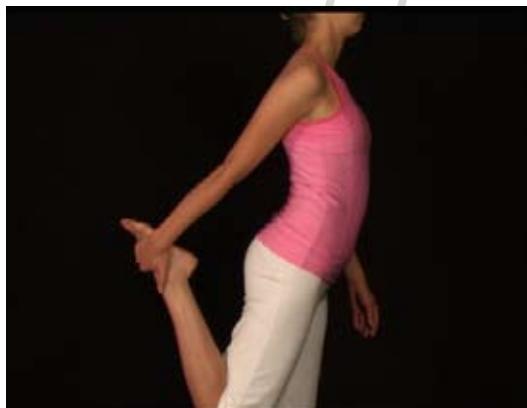


Figure 3: Incorrect form - note the excessive curve in the lower back



Figure 4: maintain the stretch in your quad and bend the left knee until you feel a stretch in your calf

Lateral Sling with Triceps

Hold Time: 15-30 seconds

Repetitions: 1

Trunk Position: Posterior Pelvic Tilt

The Lateral Sling begins at the Peroneal muscle group which has its origin on the bottom of the foot, and from there wraps around the outside of the ankle and travels up along the outside of the shin. At the knee, the Peroneal group makes a fascial connection to the Iliotibial Band (IT Band) which runs along the outside of the thigh all the way up to the hip. At the hip, the IT Band makes a connection with both the Gluteus Maximus and the Tensor Fascia Latae (TFL) muscles. These muscles then make a connection with the lateral aspect of the abdominal and trunk muscles which in turn connect with the shoulder complex, primarily through the Latissimus Dorsi. The Latissimus Dorsi and Triceps then cross each other as they attach onto the upper arm, forming a functional link between these two muscles. The lower portion of this sling is important in stabilizing the knee and hip during running and cycling. The upper portion of this sling is a critical power source during the pull phase of swimming.

To perform the Lateral Sling with Triceps stretch:

1. Begin in a standing position and cross your left foot behind your right leg (**figure 1**).
2. *NOTE: Keeping the foot on an angle so only the outside of your left foot is in contact with the mat will act to place a stretch on the Peroneal muscle group as the full stretch is executed (**figure 2**). If you find this difficult, you may need to keep your foot flat on the mat until you become more familiar with the stretch and your balance improves enough to maintain the proper foot alignment.*
3. From this position, raise your left arm up overhead and bend your left elbow, reaching your left hand back behind your head towards your upper back (**figure 3**).
4. Place your right hand on your left elbow.
5. Slide your hips to the left while leaning your upper body to the right.
6. To place a deeper stretch on the muscles of the Latissimus Dorsi and Triceps muscles, gently pull the left elbow with the right hand until you feel the stretch increase on the outer aspect of your left shoulder and upper arm (**figure 4**).
7. Hold the stretch for 15-30 seconds and repeat on the opposite side.



Figure 1: starting position



Figure 2: cross the left foot behind the right leg, keeping your left foot on an angle



Figure 3: point your elbow towards the ceiling and reach your hand towards your shoulder blade



Figure 4: slide your hips to the left and pull your trunk and elbow to the right

Hip Extension with Overhead Reach

Hold Time: 15-30 seconds

Repetitions: 1

Trunk Position: Posterior Pelvic Tilt

The Hip Extension with Overhead Reach stretch targets the hip flexor muscles, particularly the Iliopsoas muscle group. The Iliopsoas has an insertion deep on the front of the hip, and originates deep in the trunk along the anterior pelvic bone and spine. Because of the intricate attachment on the pelvis and spine, the Iliopsoas is functionally linked to other muscles of the trunk, including the Quadratus Lumborum, lateral spine muscles, and the Latissimus Dorsi muscle. As a result, it is important when stretching the Iliopsoas to include not only hip extension, but also lateral trunk flexion and overhead arm reach.

To perform the Hip Extension with Overhead Reach Stretch:

1. Begin in a standing position with the right leg extended back behind the body. The foot should be bent at the toes with the heel off the ground (**figure 1**).
2. From this position, perform a posterior pelvic tilt to ensure the stretch is concentrated at the hip and not the spine.
3. Next, bend the left knee and slide your body forward until you feel a light stretch on the front of your right hip (**figure 2**).
4. *NOTE: It is important that your back does not arch during this movement. Holding a posterior pelvic tilt during this movement should prevent this.*
5. While maintaining this stretch in your hip, reach your right arm up overhead and grasp your right wrist with your left hand.
6. Lean your upper body to the left and gently pull the arm up and to the right with your right arm. As you do this, you should feel a stretch on the outside of the right trunk and shoulder, and feel the stretch increase in your right hip (**figure 3**).
7. Hold this position for 15-30 seconds and repeat on the opposite side.



Figure 1: starting position



Figure 2: bend your left knee and slide your trunk forward until you feel a stretch in your right hip

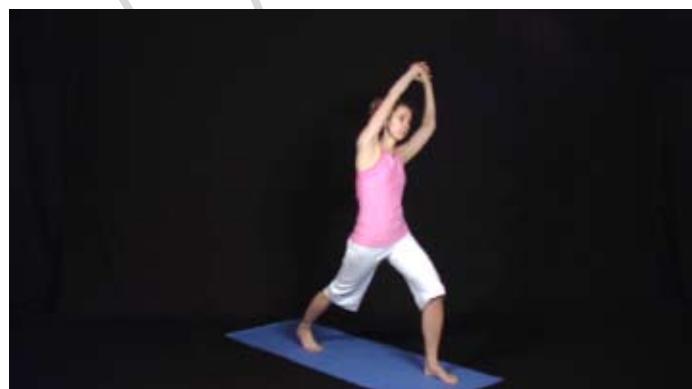


Figure 3: reach the right arm overhead and lean to the left

Lateral Oblique Sling

Hold Time: 15-30 seconds

Repetitions: 1

Trunk Position: Posterior Pelvic Tilt

The Lateral Oblique Sling consists primarily of the Adductor muscle group on the inside of the thigh, and the trunk muscles located on the lateral aspect of the spine on the opposite side of the body (particularly the Quadratus Lumborum and Latissimus Dorsi muscles). These muscles are linked through their attachment sites on the pelvis. This muscle sling is very important in stabilizing the hips, pelvis, trunk, and shoulder during running and swimming.

To perform the Lateral Oblique Sling stretch:

1. Begin in a standing position with both feet pointing forward (**figure 1**).
2. Step out sideways with your right foot. You will need to take a big step for the stretch to be effective (**figure 2**).
3. From this position, perform a posterior pelvic tilt. This will stabilize the lower back and ensure proper form throughout the stretch.
4. Bend the right knee and let your trunk shift towards the right foot (**figure 3**).
5. From this position reach the right arm up overhead, and grasp the right wrist with the left hand.
6. Keeping the trunk tall and upright, lean the upper body to the left. As you do this, you should feel the stretch increase in the left thigh, and feel a stretch on the outside of the right trunk and shoulder (**figure 4**).
7. Hold the stretch for 15-30 seconds and repeat on the opposite side.



Figure 1: starting position



Figure 2: take a wide step to the right



Figure 3: bend the right knee and shift the body toward the right



Figure 4: reach the right arm overhead and lean the trunk toward the left

CORE STRENGTH TRACT

Core Strength Tract

In addition to adequate movement and flexibility, building and maintaining adequate muscle strength is also critical to triathlon performance and injury prevention. This is particularly true for the core region as this area is critical for efficient force production and force transfer between the upper and lower body during swimming, cycling, and running. Unfortunately, like stretching, most triathletes do little to develop this critical element, and those athletes who do include core strengthening exercises in their training are usually doing the wrong exercises. Again, as we saw with stretching, if the exercises are not specific to the demands of triathlon, they will have a limited positive effect on performance and injury prevention. To better understand this, let's look at what the core muscles need to do and why.

First, you need to realize that the core is more than just the abdominal muscles. In fact, the core basically refers to the pelvis and lower trunk regions which not only includes the abdominal muscles, but also the stabilizing muscles of the hip, as well as the muscles of the back and the deep muscles that surround the spine. To train core stability, it is ineffective to focus only on the Abdominals as you are training only one part of the core. All of the muscles of the core region must be considered, and they must be trained in a way that is consistent with how they function during triathlon.

When we look at what happens at the core during swimming, cycling, and running you will notice that there really isn't much movement through this region at all – and that is the point! The core region should stay stable. That is not to say that the core muscles don't do anything. In fact, all of the core muscles must contract in order to keep the pelvis and spine stable. The stability provided by the core muscles serves several important functions that are critical to performance and injury prevention. Core muscle stability provides several vital functions; such as, establishing a stable base for the power generating leg and shoulder muscles; holding the trunk and upper body upright to facilitate force transfer between the upper and lower body; and, helping to control shock absorption at each foot strike during the running stride.

To develop the core stability that is needed for triathlon it is important to include exercises that focus on the demands of the core muscles during swimming, cycling, and running. This means incorporating exercises in which the muscles hold the core region steady, and it means training more than just the Abdominals. In the Core Strength Tract, we have included a specific set of

exercises designed to do just that. The goal of these exercises is to challenge the body to build appropriate core strength and stability, while keeping in mind that maintaining proper form with the exercises is very important. That is why with each exercise, we will actually show you several variations beginning with the easiest and progressing to very challenging levels. The idea is to begin with the exercise that you find challenging while being able to maintain the proper form. As this exercise becomes too easy, you can then progress to the next level.

We have found that to get the best results from this core strength program completing the Core Strength Tract 3-5 times a week works best. Doing the exercises following a training session works well since the muscles are pre-fatigued which helps train the endurance component of the muscle. Doing the exercise tract anytime, such as before the Performance Flexibility™ program, or incorporating the exercises into an existing strength training program is also effective. The only time to avoid the exercises is immediately before an aerobic workout, as this will cause fatigue of the muscles which will affect their ability to function properly during your swim, bike, or run.

Side Bridge

Hold Time: 10-60 seconds

Repetitions: 3-6

Trunk Position: Does Not Apply

The Side Bridge is a great exercise to not only train strength and stability of the core region, including the Quadratus Lumborum and abdominal oblique muscles, but the more advanced variation is also an effective exercise to strengthen the entire lateral sling. It is best to start with the basic side bridge exercise. Try to hold the position for up to 10 seconds, and repeat 6 times. To make the exercise more challenging, try holding the position longer and doing fewer repetitions. When you are able to hold the basic Side Bridge for 60 seconds, make the exercise more challenging by progressing to the more advanced Side Bridge variation.

Basic Side Bridge

1. Begin lying on your right side with the weight of your upper body supported on your right elbow and your hips and knees fully extended (**figure 1**).
2. From this position simply lift your hips off the mat (**figure 2**).
3. *NOTE: To ensure proper form, as you lift the hips off the mat, it is important to keep the shoulders, hips, and knees in a straight line. Do not allow your upper body to twist, or flex forward during the exercise (**figure 3**).*
4. To promote stability and muscle endurance, begin by holding the basic side bridge position for 10 seconds, and repeat 6 times. When this becomes less challenging, you can make the exercise more difficult by holding the side bridge position for up to 60 seconds.
5. Repeat on the opposite side.

Advanced Side Bridge

1. From the basic side bridge position, lift the upper leg into the air. This will place a greater demand on the muscles of the lateral sling (**figure 4**).
2. Follow the progression sequence of the basic side bridge, beginning with 10 second holds. As strength improves, increase the holding time up to 60 seconds.
3. Repeat on the opposite side.



Figure 1: starting position



Figure 2: lift the hips off the mat

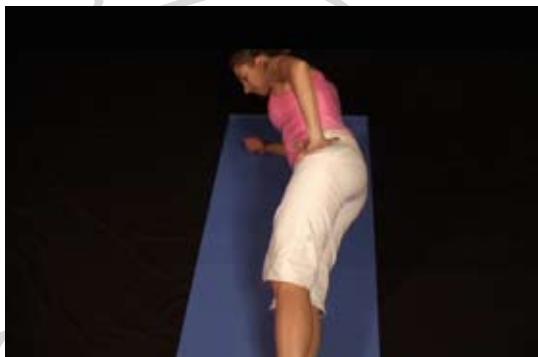


Figure 3: incorrect form - note how the upper and lower body do not line up



Figure 4: advanced progression

Plank

Hold Time: 10-60 seconds

Repetitions: 3-6

Trunk Position: Posterior Pelvic Tilt

The basic Plank exercise will help to build strength and endurance in the abdominal muscles. The more advanced progressions will also target the Anterior and Posterior Oblique slings. The goal of these progressions is to hold the hips and trunk stable as you lift an arm and/or leg off of the mat. This will train the rotational muscles of the hip, trunk and shoulder to resist the twisting forces applied as the body moves from 4 points of support to 3 or 2 points of support.

Basic Plank Exercise

1. Begin lying on your stomach with your elbows resting on the mat and the bottom of your toes in contact with the mat (**figure 1**).
2. From this position, lift your hips off the mat so that your upper and lower body form a straight line. As you do this, you should feel your abdominal muscles contract (**figure 2**).
3. To promote stability and muscle endurance, begin by holding the basic plank position for 10 seconds, and repeat 6 times. If this becomes too easy, you can make the exercise more challenging by holding the position for up to 60 seconds.

Advanced Plank Exercise

1. From the basic plank position, you can either raise an arm or raise a leg off the mat. For the most advanced version, you can lift one arm as well as the leg on the opposite side (**figure 3**).
2. *NOTE: For this exercise to be effective, as you lift the arm or leg do not allow the body to twist. Instead, hold the hip, trunk, and shoulders in a horizontal position. If your hips or trunk are twisting as you lift the arm or leg, it is a sign that the muscles are not able to fully counteract the rotational force. If this is the case it is best to focus on the basic versions of the Plank until the body is ready for the more advanced version.*
3. Follow the progression sequence of the basic Plank exercise beginning with 10 second holds. As strength improves, increase the holding time up to 60 seconds.



Figure 1: starting position



Figure 2: basic plank position



Figure 3: advanced plank position

Bridge

Hold Time: 2-10 seconds

Repetitions: 10-15

Trunk Position: Does Not Apply

The Bridge exercise will train the Gluteus Maximus, Hamstring, and lower back muscles. The more advanced progressions will introduce a rotational component which will help to target the Posterior Oblique Sling.

Basic Bridge Exercise

1. Begin lying on your back with your knees bent and feet flat on the mat (**figure 1**).
2. From this position squeeze your Glute Muscles (i.e. Your butt muscles) together to ensure proper activation of the Gluteal muscle group, and then lift your hips off the mat (**figure 2**).
3. Begin by holding this basic bridge position for 2 seconds, and repeat 10-15 times.

Advanced Bridge - 1 Leg Bridge (static)

1. From the basic bridge position, lift one leg off the mat (**figure 3**).
2. *NOTE: As you lift one leg, you will find that the body will have a tendency to twist toward the unsupported side. Concentrate on holding the hips and pelvis perfectly level which will engage the muscles of the posterior oblique sling. If you have trouble keeping the hips level, it is helpful to push the right arm into the mat. This will help activate the upper portion of the posterior oblique sling.*
3. Hold this position for up to 10 seconds, and repeat 3-5 times per side.

Advanced Bridge - 1 Leg Bridge (dynamic)

1. From the 1 Leg Bridge position lower the hips toward the mat using just one leg (**figure 4**).
2. *NOTE: Be sure to keep the hips and pelvis perfectly level.*
3. Hold the bridge position for 2 seconds and repeat 10-15 times on each leg.



Figure 1:
Starting position



Figure 2: *basic bridge position*



Figure 3:
1 leg bridge with static hold



Figure 4:
1 leg bridge - dynamic

Trunk Twist

Hold Time: Slow, Continuous Motion

Repetitions: 15-30

Trunk Position: Does Not Apply

The Trunk Twist exercise targets the Abdominal Oblique muscles as well as the rotational muscles of the lower back and spine. The basic Trunk Twist exercise involves holding the hips and knees bent to 90 degrees while rotating the hips and legs from side-to-side. A more challenging version of this exercise involves the same rotational motion, but now the legs are fully extended to add more resistance to the movement. With both variations of the Trunk Twist, simply rotate the legs from side to side in a slow and controlled manner. Let the legs fall to the side as far as possible without losing control of the motion. As your strength increases, you can also make each progression more difficult by moving the legs through a larger arc by bringing the legs closer to the mat with each repetition.

Basic Trunk Twist:

1. Begin lying on your back with your hips and knees bent to 90 degrees, and both arms extended out away from your body (**figure 1**).
2. From this position, slowly pull your knees down toward the mat and then reverse this motion to the opposite side. Let the legs fall as far as possible toward the mat without allowing the shoulders to lift off of the floor, or losing control of the movement (**figure 2**).
3. *NOTE: To make this exercise more effective, use your outstretched arms to brace your upper body as you rotate towards each side.*
4. Repeat this motion 10-15 times per side.

Advanced Trunk Twist

1. From the basic Trunk Twist position, extend your knees while repeating this same side to side motion with your legs (**figure 3**).
2. *NOTE: Use your arms to brace your upper body, and do not allow your shoulders to lift off of the mat.*
3. In a slow and controlled manner, repeat this motion 10-15 times per side.



Figure 1: starting position



Figure 2: rotate the legs to each side



Figure 3: advanced trunk twist

Bicycle Kick

Hold Time: Slow, Continuous Motion
Repetitions: To Failure
Trunk Position: Posterior Pelvic Tilt

The key element of this exercise is to hold the pelvis and trunk stable during the entire movement. This will provide a stable base for the hip muscles to contract more effectively. To ensure proper form, actively push the lower back into the mat by performing a posterior pelvic tilt and holding this contraction throughout the entire exercise. Since this is the final exercise of the Core Strength Tract, it works best when you do one set of this exercise to failure (Note: to failure refers to muscle fatigue preventing further repetitions, or a compromise of perfect form).

Basic Bicycle Kick

1. Begin lying on your back with both legs fully extended. Bring your left leg up toward your body, with your hip and knee each bent 90 degrees.
2. Next, flex your right leg and bring your knee up toward your body then reverse this motion and slowly straighten your right leg. As you straighten your leg, do not allow the foot to rest on the mat (**figure 1**).
3. Repeat this back and forth motion with the leg 10-15 times. Alternate between the right and left legs until the muscles become fatigued or your form becomes compromised.
4. *NOTE: During this movement, it is important to hold the back and pelvis stable to develop strength and endurance in the core region. To do this, gently push the lower back into the mat by performing a posterior pelvic tilt, and holding this position for the entire exercise.*

Advanced Bicycle Kick

1. To make this exercise more challenging, you can incorporate continuous motion of each leg. To do this, simply move the legs in opposing directions so that as the left leg is flexing the right leg is extending (**figure 2**).
2. *NOTE: To be effective, you must actively hold the core stable throughout the entire motion. To do this, gently push the lower back into the mat by performing a posterior pelvic tilt.*
3. Repeat this slow and continuous motion until the muscle become fatigued or your form becomes compromised.



Figure 1: *basic bicycle kick*



Figure 2: *advanced bicycle kick progression with continuous leg motion*

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